Office Action Summary	Application No. 10/780,262	Applicant(s) QIU ET AL.	
	Examiner JIANYE WU	Art Unit 2462	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *08 October 2010*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1,3-8,10-20,23-25 and 28* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☒ Claim(s) *23 and 24* is/are allowed.

6)☒ Claim(s) *1,3-8,10-20,25 and 28* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☒ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 10/08/10 has been entered.

Response to Amendments/Remarks

2. Applicant's arguments and all other documents filed on 10/08/10 have been fully considered, but are not persuasive.

3. For the rejections under 35 U.S.C. 101, Applicant argues "In paragraph [0022] … computer-storage media include … any other media that can be used to store the desired information and that can be accessed by the computing device" (The citation is from the arguments of 9/08/10, as specified in 1st paragraph of page 16 in this arguments). By this definition a computer-storage medium may include "a modulated data signal such as a carrier wave" ([0023] of Specification) because the modulated data signal stores data and is can be received/accessed by a computing device, which is not statutory.

The examiner suggests using claim language such as "A non-transitory computer readable medium".

4. For other rejections under 35 U.S.C. 103(a), Applicant’s arguments are moot because of new ground rejections (A new reference is cited in the rejection).

Claim Rejections - 35 USC § 101

5. 35 U.S.C. 101 reads as follows:

> Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

6. **Claims** 25 and 28 are rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter.

Regarding **claim 25**, it recites “A computer-readable storage medium”. There is no clear definition regarding the computer readable storage medium in Specification. The closest one is “computer storage medium” in [0022] of Specification, which can be “**any other media** that can be used to store the desired information and that can be accessed by the computing device”, which could be a non-transitory tangible media or transitory propagating signals *per se*. *See* MPEP 2111.01. The transitory propagating signal is non-statutory subject matter since it is not a process, machine, manufacture nor composition of matter; nor it is recorded on some computer-readable medium, see MPEP 2106(IV)(B)(1).

The examiner suggests a preamble as follows: “A non-transitory computer readable medium”.

Claim 28 is rejected because it has the same problems explained above.

Correction is required.

Claim Rejections - 35 USC § 103

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

8. **Claims 1** and **16** are rejected under 35 U.S.C. 103(a) as being unpatentable over Chow (US 6771966 B1, hereinafter Chow) in view of Ayyagari et al. (US 20020101822, hereinafter Ayyagari), further in view of Steer et al. (US 20040157613 A 1, hereinafter Steer).

For **claims 1** and **16**, Chow discloses a method and a computer-readable storage medium for determining placement locations of access points in network (determining and providing “node site information”, col. 20, line 61-62 and FIG. 12, including adding new nodes to networks as shown in FIG. 17 in view of “multiple such *distributing node* sites may be *deployed* in some or all such service regions, if desired”, col. 31, lines 11-13), comprising:

accepting connectivity information for the network (accepting “node site information provided”, col. 20, line 61-62 in view of FIG. 7), the network being a multi-hop wireless mesh network employing a MAC protocol (MAC sub-layer of nodes in the network as every node in a radio network has a MAC sub-layer, and all MAC sub-layer are connection-based with radio links, as shown by the network in FIG. 17) and comprising nodes and links between the nodes, the connectivity information (FIG. 7, shows the connectivity information of existing nodes and links [solid lines]), each access

point in the set of potential Access points to be open having a placement location (suggested by "node site information provided", col. 20, line 61-62 in view of FIG. 7);

iterating through each access point in the set of potential Access points to be opened ("the iterative process is repeated until the engineer is satisfied with the layout", col. 9, lines 66-67):

selecting an test access point, from the set of potential Access points (selecting links, col. 10, line 64) to be opened, to be added to a set of currently open Access points (the existing nodes on the network); and

computing node demands satisfied if the test access point is added the set of currently open Access points ("computations are run again to determine the overall characteristics of the radio topology", col. 9, line 64-66; where topology include ACCESS POINT as node);

selecting, as a new access point for the network (suggested by "to provide the best set of ratio links or radio topology once the nodes and radio sites have been identified", col. 9, lines 48-49; and "new links may be established", col. 9, Line 29; which suggests new nodes and links may be added at the selected locations to provide best service), the test access point from the set of potential Access points having a maximum computed value of the node demands satisfied (such as "maximum *number* of radio links at a node site", col. 8, line 37-39, in view of FIG. 15; or) when opened together with Access points in the set of currently open Access points (make selection iteration criterion as maximum computed value using the iterative process described in col. 9, lines 66-67);

repeating the iterating, selecting, and adding until all the node demands are satisfied (“to provide the best set of radio links or radio topology … repeated until … is satisfied”, col. 9, lines 48-67); and

implementing each access point in the set of currently opened Access points in the network at its respective placement location (for each desired location of the access point in the set of the selected nodes, implementing by the iterating process above).

Chow does not explicitly disclose that the MAC is the contention-based MAC.

In the same field of endeavor, Ayyagari et al. (US 20020101822) discloses Ethernet ([0005]) that has a the contention-based MAC based on IEEE 802.3, which is also used by most wireless communication protocols. Ayyagari further discloses that a wireless network comprises multiple nodes and links (wireless network shown in Fig. 3 or in Fig. 7) whose connectivity information comprises link capacity constraints (“link’s capacity”, [0058]), node capacity constraints (“the capacity allocated to each node”, [0025]), and node demands for flow (“node demands a higher share of the bandwidth”, [0071]); One skilled in the art would apply the access point placement method disclosed by Chow to the multi-hob wireless network disclosed by Ayyagari as suggested by Chow in claim 1 for the benefit of achieving minimized interference (col. 3, line 20-24 of Chow).

Therefore, it would have been obvious to a person of ordinary skill in the art at the time of the invention to use contention-based MAC and the performance and capacity analysis techniques disclosed by Ayyagari in the access point placement

planning disclosed by Chow to ensure the planned network to have sufficient performance and capacity to meet desired requirement.

Chow in view of Ayyagari does not specifically disclose adding and selecting new nodes as the potential access points.

Steer discloses adding new nodes and alternative links connectivity information in calculating the overall performance of the network ("to determine what frequency or frequencies are best for selection for a link from an wireless network node to a neighboring wireless network node, *a new node* seeking to establish a route to a network access node or a node seeking to improve its route to the network access node must determine information about the current network topology and frequency us", [0030]).

Therefore, it would have been obvious to a person of ordinary skill in the art at the time of the invention to apply the teaching of Steer above to the performance and capacity analysis disclosed by Chow in view of Ayyagari to ensure the planned network to have sufficient performance and capacity for the network service.

9. **Claims 3** and **10** are rejected under 35 U.S.C. 103(a) as being unpatentable over Chow in view of Ayyagari and Steer, further in view of Bush et al. (US 2004/0250128 A1, hereinafter Bush).

As to **claim 3** and **10**, Chow in view of Ayyagari and Steer discloses the method of claim 1 and 8, Chow further teaches computing the node demands satisfied if the access point is added to the set of currently open access points ("to provide the best set of ratio links or radio topology once the nodes and radio sites have been identified", col.

9, lines 48-49; which suggested add new nodes to current network when necessary) comprises:

creating a subgraph induced on a set of nodes (any subgraph of graph shown in Fig. 7), a set of currently opened Access points (solid nodes in Fig. 7), and a test access point (705 of Fig. 7);

adding a source node, the source node having edges of capacity equal to the demand of the transformed node from the source to each node in the network; adding a destination node, the destination node having edges of capacity equal to the capacity of each currently opened access point and the potential access point to be opened, from each currently opened access point and the potential access point to be opened to the destination node;

Chow in view of Ayyagari and Steer is **silent on** formulating a max-flow problem, wherein the max-flow problem computes the amount of node demands that can be satisfied under a given set of opened Access points when network throughput is independent of network path length; transforming each node's capacity constraint to an edge capacity constraint by replacing each node with a first node and a second node, the first node accepting all incoming edges to the transformed node and all outgoing edges from the transformed node originating from the second node, and creating a directed edge, having the node's capacity, from the first node to the second node; and computing the maximum flow from the source node to the destination node.

Bush teaches using directed graph for network analysis with each access point considered as a node and a directed edge between two nodes being considered as

directed traffic flow capacity constraint with throughput is independent of network path length ("in FIG. 3 a directed graph is created for a network", [0036] in view of FIG. 3), forming a directed subgraph based on a given set of access points, and formulating a traffic capacity modeling (FIG. 3, shows a network comprising nodes and links as a directed graph, with length of edge is irrelevant to link throughput), and computing max-flow based on the modeling (maximum flow analysis, [0040], line 1-2).

Therefore, it would have been obvious to a person of ordinary skill in the art at the time of the invention to modify Chow in view of Ayyagari and Steer with Bush in using directed subgraph to model a network for computing the max-flow of the network in order to use network efficiently.

10. **Claims 4, 7-8, 11** and **14-15** are rejected under 35 U.S.C. 103(a) as being unpatentable over Chow view of Ayyagari and Steer, further in view of Matsunaga et al. (US 5,440,675, hereinafter Matsunaga).

As to **claim 4**, Chow view of Ayyagari and Steer discloses the method of claim 1, wherein the computing the node demands satisfied if the access point is added to the set of currently open Access points ("to provide the best set of ratio links or radio topology once the nodes and radio sites have been identified", col. 9, lines 48-49; which suggested add new nodes to current network when necessary), but is silent on using the linear programming method to compute maximum flow the network.

In the same field of endeavor, Matsunaga discloses using linear programming to compute maximum flow a network ("to analyze and solve the allocation of resources, scheduling or the *maximum flow* which can be represented by a network, there have

been methods using a graphic theory and a *linear programming* method", col. 1, line 18-21), wherein the linear program treats throughput of a connection as independent of path length (a network model shown in FIG. 7(a)-7(e), which indicates that the throughput is independent of path length, instead, it depends on the weight of the edge); modifying the linear program to ensure that flow from each node is served by independent paths (FIG. 14 shows the independent paths in the network; an independent path is interpreted as an path with a traffic capacity); modifying the linear program to multiply the node demand by the number of independent paths (iteration in "simplex method" for solving linear programming, col. 1, line 37-43 involves modifying the parameters of the linear programming equations for the network based on the nodes and links of the network; note that Specification does not provide details of multiplying the node demand by the number of independent paths, it is interpreted as best understood); modifying the linear program to multiply the capacity constraints by a ratio of an over-provisioning factor to the number of independent paths (iteration in "simplex method" for solving linear programming, col. 1, line 37-43 involves modifying the parameters of the linear programming equations for the network; note that Specification does not provide details of multiplying the capacity constraints by a ratio of an over-provisioning factor to the number of independent paths, it is interpreted as best understood); and solving the resulting linear program ("according to the linear programming method, the relationship between the inflow and outflow in the whole network or at each node, and the restrictions of the flow rate, etc. at each branch and a corresponding objective function are analyzed by a simplex method revealed in "Guide

to Linear Programming Method" (1980)", col. 1, line 37-43, the simplex method solves the resulting linear program).

Therefore, it would have been obvious to a person of ordinary skill in the art at the time of the invention to modify Chow view of Ayyagari and Steer with Matsunaga for computing the max-flow of the network in order to use network efficiently.

As to **claim 7**, Chow view of Ayyagari and Steer discloses the method of claim 1 wherein the wherein the computing the node demands satisfied if the access point is added to the set of currently open Access points comprises:

developing a linear program to compute maximum demands satisfied in the wireless neighborhood network by opening the selected access point in conjunction with the set of currently opened Access points, wherein the linear program treats throughput of a connection as a function of a number of hops the connection traverses ([0003]);

denoting an amount of flow routed through an edge based on a position of the edge along a path;

modifying the linear program to limit the maximum flow from each node; and

solving the resulting linear program.

However, the above limitations are common procedure of solving a max-flow problem ([0040], line 8-9) using linear programming, which is well known to persons skilled in the art as suggested by Lee ([0040], line 8-14).

Therefore, it would have been obvious to a person of ordinary skill in the art at the time of the invention to modify Chow view of Ayyagari and Steer with Lee for computing the max-flow of the network in order to use network efficiently.

As to **claim 8**, Chow view of Ayyagari and Steer discloses the method of claim 1 wherein the wherein the computing the node demands satisfied if the access point is added to the set of currently open Access points comprises:

developing a linear program to compute maximum demands satisfied in the wireless neighborhood network by opening the selected access point in conjunction with the set of currently opened Access points, wherein the linear program treats throughput of a connection as a function of a number of hops the connection traverses;

modifying the linear program to ensure that flow from each node is served by independent paths (e.g., [0066]);

modifying the linear program to multiply the node demand by the number of independent paths (e.g., [0066]);

modifying the linear program to multiply the capacity constraints by a ratio of an over-provisioning factor to the number of independent paths (e.g., [0098]); and

solving the resulting linear program.

However, the above limitations are typical techniques of applying common procedure of solving a max-flow problem using linear programming, which is well known to persons skilled in the art as suggested by Lee ([0040], line 8-14)

Therefore, it would have been obvious to a person of ordinary skill in the art at the time of the invention to modify Chow view of Ayyagari and Steer with Lee for computing the max-flow of the network in order to use network efficiently.

As to **claims 11** and **14-15**, they are rejected for the same reasons as explained in claims 4 and 7-8, respectively because claims 4 and 7-8 include all limitations of claims 11 and 14-15.

11. **Claims 5-6** and **12-13** are rejected under 35 U.S.C. 103(a) as being unpatentable over Chow view of Ayyagari and Steer, further in view of McGlade.

As to **claims 5** and **12**, Chow view of Ayyagari and Steer discloses the method of claim 1 and 16, wherein the computing the node demands satisfied if the access point is added to the set of currently open Access points (suggested by “to provide the best set of ratio links or radio topology once the nodes and radio sites have been identified”, col. 9, lines 48-49; and “new links may be established”, col. 9, Line 29; which suggests new nodes and links may be added at the selected locations to provide best service);

Chow view of Ayyagari and Steer is silent on finding the shortest path from demand points to opened Access points; routing one unit of flow along the shortest path; decreasing capacities of edges on the path by one; and repeating the finding, routing, and decreasing until the shortest path found has a length greater than a hop-count bound.

McGlade teaches finding a shortest path (“by shortest path”, Col. 13, line 1-6; note that the path distance is measured in hops, as disclosed by “This distance, measured in hops”, Col. 13, line 2-3). Since an access point can either be considered as a node, the technique of finding a shortest path in general networks can be applied to networks with Access points.

Therefore, it would have been obvious to a person of ordinary skill in the art at the time of the invention to modify Chow with McGlade for computing the max-flow of the network in order to use network efficiently.

As to **claims 6** and **13**, Chow view of Ayyagari and Steer discloses the method of claim 1 and 16, wherein the wherein the computing the node demands satisfied if the access point is added to the set of currently open Access points (suggested by “to provide the best set of ratio links or radio topology once the nodes and radio sites have been identified”, col. 9, lines 48-49; and “new links may be established”, col. 9, Line 29; which suggests new nodes and links may be added at the selected locations to provide best service);

Chow view of Ayyagari and Steer is silent on finding a shortest path from demand points to opened Access points; routing one unit of flow along the shortest path; decreasing capacities of edges on the path by one; repeating the finding, routing, and decreasing until no path between any demand point and any open access point remains; and computing a demand satisfied along each path according to a throughput function.

McGlade teaches finding the shortest path (“by shortest path”, Col. 13, line 1-6; note that the path distance is measured in hops, as disclosed by “This distance, measured in hops”, Col. 13, line 2-3) and computing the max flow (suggested by “the max flow phase routes”, Col. 17, line18-20; or “FIG. 14 provides … max flow”) along the path. Since an access point can either be considered as a node, or as a part of a node,

the technique of finding a shortest path in general networks can be applied to networks with Access points.

Therefore, it would have been obvious to a person of ordinary skill in the art at the time of the invention to modify Chow with McGlade to use the shortest path and to allow the max-flow of the network in order to use network efficiently.

12. **Claims 17-18, 19-20** and **28** are rejected under 35 U.S.C. 103(a) as being unpatentable over Chow view of Ayyagari and Steer, further in view of Layson et al. (US 6,405,213 B1, hereinafter Layson).

For **claims 17-18, 19-20** and **28**, they are the claims similar to corresponding claim 1 and 16 (note that in claim 17-18 and 20, access points and nodes are used corresponding to Access points, they are nodes interpreted as Access points since they are not defined in Specification and have same functions as Access points), with the iteration performed on a set of time intervals.

Chow view of Ayyagari and Steer discloses claim 1 and 16, does not explicitly disclose iterating through a set of time intervals.

In the same field of endeavor (wireless communication), Layson discloses iteration over time interval ("an iterative process where the time interval for each iteration", col. 16, lines 50-52). From mathematical point of view, iterating process may use any set of parameters for iteration, including the time interval in additional to network parameters such as links and nodes.

Therefore, it would have been obvious to a person of ordinary skill in the art at the time of the invention to Chow view of Ayyagari and Steer with Layson to iterate over time intervals for optimization.

Allowable Subject Matter

Claims 23 and 24 are allowed.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jianye Wu whose telephone number is (571)270-1665. The examiner can normally be reached on Monday to Friday, 8am to 5pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Seema Rao can be reached on (571)272-3174. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Jianye Wu/
Examiner, Art Unit 2462